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Research Associate in Modelling of CO₂ Removal in Rivers and Aquifers

Faculty of Science,
School of Biosciences

Overview

We are seeking to appoint an experienced Research Associate in the general field of modelling of freshwater geochemistry to join a dynamic, high-profile research project: the Greenhouse Gas Removal with UK agriculture via enhanced rock weathering Demonstrator, funded by UKRI-BBSRC (2021-2025). The Demonstrator is a UK focused integrated whole system assessment of the science, societal and scalability opportunities and challenges of enhanced rock weathering (ERW) to help the UK reach Net Zero by 2050. This Demonstrator is one of five, coordinated by the Directorate Hub, CO₂RE.

The Research Associate will be embedded within the Leverhulme Centre for Climate Change Mitigation (LC³M) at the University of Sheffield, funded by a Leverhulme Trust Research Centre Award. UKRI partners on this large research consortium project include a number of leading UK institutions and scientists working in the exciting field of atmospheric CO₂ removal.

This post is in the project modelling team led by Professor D.J. Beerling FRS, and project partners at U. Leeds Professor S.A. Banwart and Professor L.J. West. The appointed Research Associate will assess the security of carbon dioxide removal (CDR) in the UK resulting from ERW during transport of weathered products in rivers and groundwater from agricultural land to the marine environment. The Research Associate will assess the extent to which Greenhouse Gas Removal (GGR) efficiency by ERW may be affected by carbonate precipitation or other interactions with groundwater and river systems during water flow and transport to the coastal margins at national scale. For example, the extent to which fate of ERW products during transport in groundwater, streams and rivers is influenced by alkalinity, pH and aqueous carbonate speciation, carbonate mineral precipitation and carbon dioxide gas exchange with the atmosphere. The goal is to produce a UK-wide scenario-based evaluation of the net GGR potential of ERW and its contribution to the UK's net zero target incorporating new evaluation of critical uncertainties. The project will thus require construction of a geospatial dataset of freshwater chemistry to upscale the local impacts to predict UK-wide ERW efficiency.

You will have experience of in handling and processing large geospatial datasets e.g. using geographical information systems and ideally, experience with geochemical data or modelling (e.g., using USGS hydrogeological code PHAST or similar codes). Experience with chemistry of rivers and/or groundwaters would be an advantage. You will be responsible for writing scientific papers and reporting to other members of the GGR consortium, presenting at annual meetings, and other research events. You will have excellent interpersonal, communication and organisational skills, with the ability to manage a varied workload.

Person Specification

You should provide evidence in your application that you meet the following criteria. We will use a range of selection methods to measure your abilities in these areas including reviewing your online application, seeking references, inviting shortlisted candidates to interview and other forms of assessment action relevant to the post.

The University of Sheffield is proud to be a Disability Confident Employer, we commit to recruit and retain disabled applicants and support positive action. We encourage disabled people to apply for our jobs and to have the opportunity to demonstrate their skills, talent and abilities at the interview stage. We commit to offer an interview to disabled applicants who meet the minimum criteria for the job. For further information on the Disability Confident Scheme, please follow the [link](#).

Criteria		Essential	Desirable
1.	A PhD (or equivalent experience) in geochemistry, hydrogeology, water quality modelling, geoscience or related fields.	X	
2.	Experience and confidence in handling and processing large geospatial datasets with GIS or similar software packages	X	
3.	Experience with geochemical reactive transport modelling, including coding skills		X
4.	Expertise in freshwater chemistry of rivers and/or groundwaters		X
5.	Demonstrable capacity for original thought and a strong interest in multidisciplinary research	X	
6.	Effective communication skills, both written and verbal, scientific paper and report writing skills, experience of delivering presentations	X	
7.	Ability to develop creative approaches to problem solving.	X	
8.	Ability to analyse and solve problems with an appreciation of longer-term implications.	X	
9.	Be highly motivated with the ability to work effectively both under own initiative and within a team.	X	
10.	Experience of a range of project management approaches.	X	

About the Faculty

The Faculty of Science is one of the leading Science faculties within the UK and one of five faculties within the University of Sheffield. We have a turnover of £114m, over 1,000 staff and approximately 5000 students working and studying across the classical science subjects. We organise ourselves around three academic departments, and two schools:

- Biosciences
- Chemistry
- Mathematics and Statistics
- Physics and Astronomy
- Psychology

Our mission is to understand our world, ourselves and our place in the Universe. For further details about the Faculty of Science please visit our website at www.sheffield.ac.uk/faculty/science

About the School

The [School of Biosciences](#) has been created from a merger of the three Biology Departments: Animal and Plant Sciences, Biomedical Science and Molecular Biology and Biotechnology. The school brings together over 120 academics with a breadth and depth of excellence in multiple areas. The school will create an enhanced Learning and Teaching offering giving students opportunities to experience a greater breadth of Bioscience teaching outside their main programme, and enhanced leadership and coordination of research to better promote excellence and successful exploitation of opportunities.

About the Team

You will be part of the high-profile research project: the Greenhouse Gas Removal with UK agriculture via enhanced rock weathering Demonstrator, funded by UKRI-BBSRC. The project

modelling team (and Demonstrator) is led by Professor D.J. Beerling FRS, and project partners at U. Leeds Professor S.A. Banwart, and Professor L.J. West at University of Leeds.

Based in Sheffield, you will liaise with the Partner teams at: National Oceanography Centre (NOC), Rothamsted Research, UK Centre for Ecology & Hydrology (UKCEH) and Universities of Aberdeen, Cardiff, Heriot-Watt, Leeds, Oxford and Southampton and also engage with the CO₂RE Hub activities and working groups, as required.

Job Description

Main Duties and Responsibilities

- Conduct research to assess the security of carbon dioxide removal (CDR) in the UK resulting from ERW during transport of weathered products in rivers and groundwater from agricultural land to the marine environment.
- Develop and undertake a modelling strategy for assessing the extent to which greenhouse gas removal (GGR) efficiency by ERW may be affected by carbonate precipitation or dissolution in soil, groundwater and river systems during water flow and transport to the coastal margins at national scale.
- Model the fate of ERW products during transport in groundwater, streams and rivers to consider the effect of alkalinity changes on pH and aqueous carbonate speciation, carbonate mineral precipitation and carbon dioxide gas exchange with the atmosphere.
- Be responsible for writing scientific papers and reporting to other members of the GGR consortium, presenting at annual meetings, and other research events.
- Develop and produce UK-wide scenario-based evaluation of the net GGR potential of ERW and its contribution to the UK's net zero target incorporating new evaluation of critical uncertainties.
- Liaise effectively with members of the GGR consortium, LC3M project partners and other collaborators involved in the research programme.
- Engage in and contribute to Research Project meetings, Working Group meetings and Conferences, as required.
- You will make a full and active contribution to the principles of the 'Sheffield Academic'. These include the achievement of excellence in applied teaching and research, and scholarly pursuits to make a genuine difference in the subject area and to the University's achievements as a whole.
- As a member of staff you will be encouraged to make ethical decisions in your role, embedding the University sustainability strategy into your working activities wherever possible.
- Any other duties, commensurate with the grade of the post.

Reward Package

Terms and conditions of employment: Will be those for Grade 7 staff.

Salary for this grade: £35,333 per annum.

This post is fixed-term with a start date as soon as possible and an end date of 31 August 2025 (subject to continued funding beyond mid-point review).

This post is full-time:

This role has been identified as a full-time post, but we are committed to exploring flexible working

opportunities with our staff which benefit both the individual and the University. Therefore, we would consider flexible delivery of the role subject to meeting the business needs of the post. If you wish to explore flexible working opportunities in relation to this post, we encourage you to call or email the departmental contact listed below.

If you join the University you will have access to a Total Reward Package that includes a competitive salary, a generous Pension Scheme and annual leave entitlement, as well as access to a range of learning and development courses to support your personal and professional development. You will have access to your own personalised portal where you can also access a comprehensive selection of benefits and offers to suit your changing lifestyle needs, for example financial wellbeing, travel options, shopping and cinema discounts.



The University is committed to tackling the global climate emergency. Our sustainability strategy forms an integral part of all we do. We strive to embed this in all areas of university life, from our students' education, the globally impacting international research we contribute, to campus life.



We aim to empower staff to work sustainably by giving them the knowledge to make ethical decisions at work and home. Staff have the opportunity to be involved in impactful sustainability projects through the nationally recognised Green Impact scheme.

Staff have access to excellent green benefits including the cycle to work scheme with discounts and free secure bike storage, as well as many greener choices across campus.

If you have an interest in this area, the university will strive to passionately support you in these commitments. Check out www.sheffield.ac.uk/sustainability for more information.

The University of Sheffield recognises the importance of creating a positive environment, whereby all staff feel able to talk openly and with trust about wellbeing and mental health.

Our Staff Wellbeing offer, encourages and supports staff to maintain their own positive health and wellbeing through a range of accessible, inclusive and supportive services and activities.

Our leadership development has been designed to ensure that our leaders have the knowledge, skills and behaviours needed by the University.

Inclusion at Sheffield is everyone's responsibility. Our vision is to build a University community that actively attracts, engages and develops talented individuals from many different backgrounds.



We are proud of our award-winning equality, diversity and inclusion action, and 90% of staff tell us they are treated with fairness and respect (staff survey 2018). We continue working to create a fully inclusive environment where everyone can flourish.

Selection – Next Steps

Closing date: For details of the closing date please view this post on our web pages at www.sheffield.ac.uk/jobs

Following the closing date, we will contact you by email to let you know whether or not you have been shortlisted to participate in the next stage of the selection process. Please note that due to the large number of applications that we receive, it may take up to two working weeks following the closing date before the recruiting department will be able to contact you.

It is anticipated that interviews and other selection action will be held in the weeks following the closing date. Full details will be provided to invited candidates.

For more information on our application and recruitment processes visit www.sheffield.ac.uk/jobs/application-tips

Informal enquiries

For informal enquiries about this job and the recruiting department, contact David Beerling's PA: Debbie Hill by email at d.hill@sheffield.ac.uk

For administration queries and details on the application process, contact the School of Biosciences HR Team at bioscienceshradmin@sheffield.ac.uk

For all online application system queries and support, visit: www.sheffield.ac.uk/jobs/faqs

Creating a remarkable place to work

We build teams of people from different heritages and lifestyles from across the world, whose talent and contributions complement each other to greatest effect. We believe diversity in all its forms delivers greater impact through research, teaching and student experience.

We are consistently ranked in the top 100 of the world's universities, but there's so much more to us than that. By joining the University, you will be joining award-winning teams and departments who are all working together to make the University of Sheffield a remarkable place to work.